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FEDERAL-GRANT RESEARCH

at the

STATE AGRICULTURAL

EXPERIMENT STATIONS

Projects in

PLANT PATHOLOGY

Part 17, Section d

Diseases of Vegetables

Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

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the State Experiment Stations Division, Agricultural Research Service, U. S. Department of Agriculture, Washington 25, D. C., for use of workers in agricultural research in the subject-matter areas presented. For information on specific research projects write to the Director of the Station where the research is being conducted.

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DISEASES OF VEGETABLES

Contents

INTRODUCTION

This compilation is one of a series providing information on State agricultural experiment station research supported by Federal-grant funds appropriated annually by Congress under authorization of the Hatch Act of 1887, as amended and approved Aug. 11, 1955, and Section 204(b) of the Agricultural Marketing Act of 1946. It is prepared for use by research workers in the subject-matter areas presented. Only that part of each State's research program supported by Federal-grant moneys is included.

In addition to the Federal-grant moneys, the State experiment stations receive some Federal support through cooperative agreements or contracts with the U. S. Department of Agriculture. Information on such research, along with other departmental research, is available in the Central Project Office, Agricultural Research Service.

A substantial part of each State agricultural experiment station's research is supported with moneys appropriated by the respective State or Territorial Legislatures and through other forms of private and public financing. Information on current agricultural research at the stations which is not financed under the Federal-grant program or through USDA cooperation can be obtained from experiment station directors.

The information given in the series of Federal-grant compilations includes the title and objectives of each Federal-grant project pertaining to the subject given on the cover. The identification of each project gives the department(s) conducting the research, the station number of the project, and the number of the regional project if it is a contributing project.

Relevant regional projects, if any, appear at the end of the compilation. States having projects contributing to regional projects are indicated. The Roman numeral (and capital letter) refer to the location in the summary of the contributing project title and objectives. The States are grouped into four major regions. These are designated NC-North Central, NE-Northeastern, S-Southern, and W-Western. The capital letter "M" following the letters for the region indicates regional marketing projects.

DISEASES OF VEGETABLES

General

Ala. Breeding of Certain Vegetables for Better Adaptation to Southern Conditions, With Particular Reference to Home and Market Garden Types. To develop in certain designated vegetables, home, market garden, and commercial varieties, which have resistance to diseases commonly troublesome in the South, and which are generally adapted to the soil and climatic conditions of this region. Vegetables will include tomatoes, peppers, lima beans, English peas, and Southern peas.
Hort. 412

Ariz. Virus Diseases of Vegetable Crops, Including Melons in Arizona. (1) Etiological studies on several viruses of melons, potatoes, celery, and lettuce; (2) studies of weed-host ranges, overwintering phenomena, etc., of viruses and their vectors; (3) investigations of now-used crop rotation; and (4) unique ecological factors (climatic and edaphic) found only in this area, and their relation to prevalence of certain viruses of vegetables.
Pl. Path. 286

Ariz. Control of Root-Knot of Vegetables. Find means of controlling root-knot nematodes.
Pl. Path. 406 Coop. ARS

Ariz. The Control of Mildews of Muskmelon and Lettuce. (1) Evaluate fungicides as means of controlling powdery mildew of muskmelon and downy mildew of lettuce; (2) study any other means of controlling these diseases.
Pl. Path. 408

Del. Control of Pepper and Squash Diseases. To study (1) etiology of anthracnose (Colletotrichum nigrum); (2) epidemiology and control of anthracnose and bacterial leaf spot (Xanthomonas vesicatoria); (3) breed for disease resistance.
Pl. Path. 19P

Del. Development and Control of Vegetable Diseases Under Irrigation. To determine influence of overhead irrigation on (1) incidence and severity of various diseases of vegetable crops known to be problems in Delaware; and (2) effectiveness of recommended fungicide spray and dust schedules.
Pl. Path. 56P

Ga. Control of Diseases of Pimiento Pepper and Other Vegetables. (1) Develop better control measures for diseases of pimiento pepper; (2) learn nature and seriousness of diseases present on other vegetables of importance to local canning industry and develop control measures if warranted; (3) assist horticulturists with variety testing of vegetables by making disease determinations and ratings.
Pl. Path., Hort. 103

Hawaii Cucurbit and Legume Breeding. To improve disease resistance, market quality, yield, and tolerance to agricultural chemicals of watermelons, cucumbers, muskmelons, pumpkins, squash, edible podded peas, pole and bush beans, and edible soybeans.
Veg. Crops 814

Hawaii Improvement of Leafy Vegetable Crops. Lettuce, Cabbage(Head and Oriental), Cauliflower and Broccoli. (1) Obtain new varieties of above crops as meets changing needs of Hawaiian agriculture and markets; (2) lettuce growers want a tipburn free, loose, butter leaf type variety with no preference for heads or non-heads in lowlands but 2-2-1/2# crisp leafy heads in uplands. Cabbage should have short core, uniform-ripening resistance to clubroot and mildews. Cauliflowers should mature from 75-80 days, good shaped and sized white curds, with protecting erect wrapper leaves, and heat resistance. Growers want heavy yield in center heads and side shoots of good market quality broccoli; (3) new varieties should resist diseases and insects, and yield high in minerals and vitamins.
Veg. Crops 815

Iowa Cultural Studies With Canning Crops. To (1) study rates and methods of fertilizer applications; (2) learn most efficient rotation for canning crops; (3) evaluate different methods and rates of planting; (4) learn best methods and amount of cultivation for row crops; (5) study effects of fungicides on control of leaf defoliating diseases of tomatoes; (6) secure data on effects of growth substances on blossom drop as influenced by environmental conditions and variety; and (7) learn effects of above objectives on quality of canning crops.
Hort., Agron. 1105

Iowa Improvement of Vegetable Crops for Canning Through Breeding. (1) Tomatoes--Use hybrid vigor to improve yields and quality; transfer morphological sterile character to varieties showing high combining ability; improve internal color; develop environmental and genetic cracking resistant lines; improve disease resistance; and learn effect of above factors on quality; (2) Lima Beans--develop large seeded high quality type resistant to heat conditions; and (3) Cucurbits--incorporate vine borer resistance of moschata species in maxima species; and develop lines with desirable maturity, shape, consistency, and flesh color.
Hort., Bot., Pl. Path. 1106

Md. Evaluation of Fungicides for the Control of Diseases of Vegetable Crops. To (1) study effects of fungicidal materials upon metabolic processes in cells of fungi and other organisms to elucidate mechanisms of fungicidal action; (2) continue to test performance of new fungicides and formulations, as they are available, and compare with materials already used as to effectiveness in controlling diseases of vegetables in Maryland; (3) attempt to correlate laboratory findings with field performance; and (4) devise and evaluate improved methods to apply fungicides to foliage and seed of vegetables and to soils to control pathogens of those crops.

Agr. Engin. J-91 Coop. HEW-PHS

Mass. Breeding Sweet Corn, Peppers and Field Tomatoes for Massachusetts. Early types and varieties of sweet corn, peppers and field tomatoes will be developed that are adapted to the climatic conditions found in Massachusetts as well as sorts that may be resistant or immune to certain insects and diseases that prevail there.

Hort. 86

Mich. Microbiological Investigations of Vegetable Diseases. To study (1) microflora associated with selected vegetable plant pathogens with respect to inhibitory or synergistic action; (2) effects of crops and chemical and biological additives to the soil on soil-borne pathogens and associated microflora; (3) effects of products of microfial metabolism, including antibiotics, on vegetable pathogens and host plants.

Bot. & Pl. Path. 826

Minn. Breeding Disease Resistant Vegetables. To (1) develop better varieties of muskmelons and watermelons and to work out improved breeding methods where feasible; (2) obtain selections of tomatoes resistant to mosaic, late blight and leaf diseases and to study plants and diseases in relation to each other.

Hort. & Pl. Path. 2126

Minn. Radiation as a Tool in Horticultural Crop Breeding. (1) Study mutagenic effectiveness of radiations upon several fruit and vegetable plants with respect to dosage, conditions, and time of radiation, and in relation to periods of growth, dormancy, and rest periods of plants and seeds; (2) study effects of radiations on subsequent development of plants and seeds; (3) produce mutations useful to fruit and vegetable breeders.

Hort. 2127 Coop. ARS

Minn. Epidemiology of Leaf Spots and Other Foliage Diseases of Crop Plants.--IV, Potato, Tomato, and Truck Crop Diseases. To learn the sources of inoculum of leaf diseases organisms and the effect of environmental conditions on leaf diseases of potatoes and other vegetables, principally tomatoes.

Pl. Path. & Bot. 2219-4

Minn. Cause and Control of Biological and Chemical Deterioration of Agricultural Products in Storage--II, Potatoes and Other Vegetables. To determine (1) effect of chemical vine killers, wet soil, mud in storages and washing on the decay of potatoes in storage and transit, and to devise control methods; and (2) causes of decay on rutabagas in storage.
Pl. Path.& Bot. 2220-2

Miss. Resistance to Root-Knot Nematodes in Pepper, Cowpeas, and Tomatoes. (1) Investigate resistance to root-knot nematodes found in certain strains of pepper, cowpeas, and tomatoes; determine (2) mode of inheritance of such resistance; (3) possible linkages with any undesirable plant characters.
Pl. Path & Physiol. HD-12,RRFL-2 (S-19)

Mo. The Breeding, Improvement and Testing of Vegetable Varieties. (1) Breed disease resistant watermelons for commercial production in State; (2) evaluate wilt resistant hybrids of L. pimpinellifolim and L. esculentum and breed for improved horticultural characteristics; (3) test adaptability of vegetable varieties to State.
Hort. 128

N. H. Breeding Better Vegetables for New Hampshire. To develop new varieties of vegetables having superior qualities in one or more of these respects: better adapted to the climate, higher in nutritive value, more productive, better appearance, and disease and insect resistant.
Hort., Agr.& Biol. Chem. 54

N.Y. (State) The Nature and Development of Resistance to Diseases of Canning Crop Vegetables. To (1) search for and develop any inherent resistance or tolerance that may be found to major diseases of canning crop vegetables; (2) study and determine factors affecting disease development in susceptible host to insure sound procedure in evaluation of breeding progenies from crosses with resistant lines and to determine nature of resistance to expedite development of a practical resistance; and (3) incorporate resistance into horticulturally desirable varieties.
Pl. Path. 7

N.Y. (State) Development of Improved Strains of Canning Crop Vegetables. 1. Breeding of Heat-Tolerant, Root-Rot Resistant Peas for Canning and Freezing. To breed variety of peas of good quality, resistant to root rot and tolerant of heat.
Veg. Crops 16a

N. C. Studies on the Cause and Control of Diseases Affecting Vegetable Crops in North Carolina. To develop more adequate methods of controlling important diseases through studies to learn prevalence, cause, seasonal development and economic importance of major diseases of vegetable crops; (2) studies on life history, perpetuation and distribution of causal agents and influence of environmental factors on them; and (3) studies on control of these diseases by cultural practices, cropping sequences, and application of chemical treatments to seeds, plants and soil.
Pl. Path. H-89

Ohio The Comparison of New Fungicidal, Chemotherapeutic, and Nutritional Formulations for the Control of Vegetable Diseases. To (1) compare newly introduced materials with fungicidal properties with better established or recommended formulations in their ability to control vegetable diseases; and (2) learn limitations and specificities of various new materials other than fungicides for use in vegetable disease control program.
Bot. 19-1

Ohio The Development of New Methods for the Application of Fungicidal Formulations to Vegetables, with Particular Reference to the Use of Low-Gallonage Sprays. To develop methods whereby low-gallonage, or concentrate, spray applications may be made to vegetables in such a manner that the resulting degree of disease control will be equal or similar to that obtained with the more dilute formulations now in common use.
Bot. 19-2

Ohio The Improvement of Vegetable Stands by the Use of Seed Treatments. To determine what chemical compounds or formulations are most effective as seed treatments in combating damping-off and thus improving stand of various vegetables in different types of soil.
Bot., Pl. Path. 19-3

Ohio Control of Soil-Inhabiting Nematodes, Fungi, Bacteria and Insects Affecting Vegetable Crops. To (1) determine and classify soil-inhabiting organisms responsible for economic loss on vegetable crops growing in Ohio soils; (2)devise means of controlling most destructive organisms; and (3) design and test types of equipment and application techniques for use in applying various liquid and dry formulations in the control of soil-inhabiting pest complex on vegetables.
Bot., Ent., Agr. Engin. 131 Coop.ARS

Ohio — Distribution Study of Plant Parasitic Fungi and Nematodes. Delineate any areas of poor plant growth, learn cause of uneven development of crop plants, and then correct the unfavorable soil condition.
Pl. Path. 131 Supplement

Wash. — Breeding for Curly Top Resistance in Vegetable Crops. To produce commercially acceptable and home garden strains of tomatoes resistant to curly top disease.
Hort. 1017

Beans and Peas

Ark. — Breeding and Selecting Southern Peas. Develop varieties of black-eye, cream and purple hull with desirable processing and table quality; high yield ability; adaptability to mechanical harvest; disease resistance, especially to fusarium, cercospora and nematode; and freedom from split seed coats.
Hort. & For. 430

Colo. — Testing Foreign Bean Introductions for Resistance to Root Rots and Other Diseases. To (1) determine resistance of foreign introduction and other sources of germplasm to root rotting organisms of beans; (2) determine compatibility of most promising selections in crosses with best varieties of beans now grown; (3) initiate breeding program whereby new or improved varieties resistant to organisms causing root rots will be developed; and (4) determine, incidentally, resistance of foreign introductions to other diseases common to the region.
Agron. 85 (W-12) Coop. ARS

Del. — Diseases of Lima Bean and Their Control with Special Reference to Root Rot, Web Blight, and Downy Mildew Diseases. (1) Study etiology and epidemiology of Rhizoctonia solani, causal agent of root rot and web blight of lima bean and Phytophthora phaseoli, causal agent of downy mildew of lima bean; (2) develop control methods; (3) make periodic observations for other lima bean diseases.
Pl. Path. 20P Coop. ARS

Ga. — Improvement of Type and Disease and Insect Resistance in Southern Peas (Vigna Sinensis) Through Breeding. To develop productive varieties of Southern peas with improved qualities for processing and fresh market and to incorporate into these a resistance to Fusarium wilt, powdery mildew, bacterial blight; and nematodes.
Hort. 92

Idaho — Development of Field and Garden (Dry and Snap) Beans Resistant to Certain Virus Diseases, and a Study of the Viruses Causing These Diseases. To (1) develop, through breeding, new varieties of field and snap beans of acceptable quality, having resistance to common mosaic, curly top, and other important bean viruse diseases; and (2) conduct fundamental research on viruses causing diseases of beans, as related to their properties, relation to each other, and to expression under different environmental conditions.

Pl. Path. 282 (W-12) Coop. ARS

Idaho — The Control of Root Rots of Peas and Beans with Special Reference to Form Species of Fusarium Solani. (1) Learn if micro-flora of the soil can be altered by crop rotations using various crop sequences; (2) correlate changes in the micro-flora of soil with the incidence of root rots of peas and beans caused by Fusarium solani; learn (3) value of chemotherapeutants in control of root rot; (4) potential value of non-agricultural species of peas and beans as breeding stock for development of root-rot resistant varieties.

Pl. Path. 339

Maine — Breeding of Blight and Anthracnose Resistant Varieties of Beans. To obtain through selection and/or hybridization suitable market type snap and field beans resistant to halo blight (Pseudomonas phaseolicola) and local strains of anthracnose (Collectotrichum lindemuthianum).

Hort. 17

Mich. — Evaluation of Peas for Horticultural Characters and Resistance to Root Rots and Viruses. (1) Evaluate P. I. accessions of Pisum sativum for horticultural characters; (2) effect a systematic program for evaluating P. I. accessions of Pisum sativum for resistance to following: Aphanomyces root rot (A. euteiches), Fusarium root rot (F. sativum f. pisi); (3) perpetuate disease-resistance accessions as they are discovered and make preliminary crosses with locally adapted strains and varieties under State support.

Pl. Path. 837 (NC-7)

Miss. — Investigation of Pea Diseases and Their Control. To (1) learn occurrence of major pea diseases in Mississippi and relative importance; (2) investigate life cycles of major pathogens in relation to culture of the crop and climate and learn if there are effective control methods; (3) develop greenhouse and field techniques for determination of resistance and susceptibility; and (4) investigate seed stocks now available for resistant varieties which may be incorporated into types found in this region.

Pl. Path. H1-10

Miss. Investigation of the Diseases of Cowpeas and Their Control. To (1) learn what diseases other than Fusarium wilt, occur on cowpeas in Mississippi and relative importance; (2) investigate life cycle of pathogens and disease cycle of pathogens and disease cycle of any damaging disease found under (1); (3) design and conduct experiments on control measures wherever control is deemed necessary and appears feasible; and (4) investigate Fusarium wilt disease thoroughly and develop suitable control.
Pl. Path. HL-11

Nebr. Bean Breeding. To develop new varieties of field beans (Phaseolus vulgaris) having resistance to disease, improved horticultural characters and adapted to Nebraska conditions.
Hort. 436 Coop. ARS

N. Mex. Effects of Crop Residues on Bean Root Rot Pathogens and Associated Microflora as Related to the Development of the Disease. Investigate effects of certain crop residues on growth and reproduction of bean root rot pathogens. Learn influence of certain crop residues on development of microflora antagonistic or synergistic to this pathogen. Study influence of soil temperature on rate and extent of colonization of plant residues by various components of soil microflora.
Bot. & Ent. 73 (W-38) Coop. ARS

N. Y. (Cornell) Bean Breeding. To develop varieties and strains of dry and snap beans, superior to the present in yielding ability, disease resistance, earliness, quality, and adaptability to mechanical harvesting.
Pl. Path., Pl. Brdg., Veg. Crops. 120

N.Y. (State) The Production of New Varieties of Snap Beans by Breeding. To (1) develop new varieties of green and wax beans to more nearly fit needs of N. Y. growers and processors, including high yield, disease resistance, earliness, and general high quality and especially having white seeds, more slender pods, and an upright bush which bears pods high and matures crop all at one time to facilitate mechanical picking; and (2) add to the knowledge of genetics of beans by studying genetic characters where they affect the breeding program.
Veg. Crops. 16b

N.Y. (State) Breeding New Varieties of Lima Beans for Processing in New York. To (1) produce a lima bean of Fordhook type with these characteristics: green cotyledon, green seed coat, earliness, concentrated set, and high yield--also nematode tolerance and downy mildew resistance, if possible; (2) add to genetic knowledge of lima beans by working out the inheritance of characters involved in breeding project when possible.
Veg. Crops. 16c Coop. ARS

Oreg. Resistance to Strains of Yellow Mosaic Virus and Related Major Viruses of Beans in the Western Area. Learn reaction of bean breeding lines, varieties and species to a wide range of bean yellow mosaic (BYMV) strains occurring in the western region.
Bot., Pl. Path. 491 (W-12)

S. C. Breeding Edible Southern Peas. To develop high quality, high shelling, and suitable as dry, processing, or fresh market peas.
Hort. 61

Tenn. Inheritance in Garden Beans with Reference to Resistance to Mexican Bean Beetle and Other Insects, Nematodes, Diseases, Southern Adaptation and Commercial Quality. To study possibilities of combining species, kinds and varieties of beans in order to develop Southern garden beans.
Hort. 121

Wash. Insect Transmission of Bean Virus Diseases. To learn (1) what insects are responsible for field transmission of bean virus diseases; (2) seasonal cycles, field distribution, and alternate hosts of those insects transmitting the diseases; (3) effect of insect control on field spread of virus diseases of beans; and (4) native and cultivated plants which serve as reservoirs of bean virus diseases.
Ent. 1221 (W-12) Coop. ARS

Wyo. Bean Diseases in Wyoming. To (1) learn prevalence and extent of damage of various known bean diseases; (2) learn host range; (3) study methods of spread; (4) evaluate cultural and chemical control practices; (5) test lines and varieties of beans to the various diseases; (6) study cultural characters and nature of pathogens in laboratory and greenhouse; (7) learn physiologic races of bean rust and possibly of other bean diseases; and (8) collect and study new diseases which may appear.
Agron 497 Coop. ARS

Wyo. Control of Root Rots and Viruses of Dry and Snap Beans by Breeding and Other Methods. (1) Study pathogenic variation of bean root rotting organisms found in western region; (2) measure level of pathogenicity and population density of bean root rotting organisms as influenced by irrigation frequencies.
Agron. 563 (W-12)

Cucumbers and Melons

Ala. Factors Affecting the Development and Control of Gummy Stem Blight of Cucurbits. To (1) determine factors affecting disease development of gummy stem blight; and (2) develop control measures for gummy stem blight.
Bot. & Pl. Path. 550

Ariz. Breeding and Improvement of Melon Varieties. Maintain (1) canteloupe strain testing; (2) cantaloupe breeding; (3) maintenance of standard varieties; (4) breeding other muskmelons; (5) watermelon breeding.
Hort. 295 Coop. ARS

Ark. Breeding and Selecting Watermelons. To secure an early maturing, wilt resistant variety or strain of watermelons, capable of producing high yields of melons with high table quality and adapted to the marketing methods used in Arkansas.
Hort. & For. 207 Coop. ARS

Ark. Breeding and Selecting Pickling Cucumbers. (1) Develop a high yielding, bunch bearing variety resistant to downy mildew and anthracnose possessing pickling qualities of firmness retention in salt process, dark green color, desirable shape, tender rind, and slow seed development; (2) make study of blossom retention as it relates to softening in salt curing processes.
Hort. & For. 429 Coop. ARS

Calif. Investigation of the Virus Disease Complex of Cucurbits. Learn (1) distribution, prevalence, and identity of different viruses in cucurbit crops in State; (2) which are seed-borne, percentage of seed transmission, and relation to occurrence and severity; (3) insect vector(s) of different viruses and host range of each type; (4) study relation of cucurbit virus with closely related viruses attacking other crops.
Pl. Path. 1746 Coop. ARS

Fla. Virus Diseases of Cucurbits and Other Vegetables in Central Florida. To determine mosaic viruses causing diseases of cucurbits, their host range, their insect vectors, and nature of the disease in efforts to develop practical control measures.
Pl. Path. 538

Ga. Breeding Watermelons for Disease Resistance and Market Needs. To develop resistance to Fusarium wilt, anthracnose, and other diseases in two types of watermelons, (1) high quality, refrigerator size melons; and (2) large melons of 30 to 40 pounds.
Pl. Path. 98

Ga. Breeding High Quality Market Type Cantaloupes Resistant to Disease, Insects, and Adverse Physical Environment. To breed a cantaloupe variety with good edible and shipping qualities that has enough resistance to all important diseases and insects to be profitably produced in any part of Georgia without the expense of spraying, irrigation, and extremely heavy fertilization.
Pl. Path. 99

La. The Control of Cucumber Anthracnose by Means Other Than Foliar Fungicide Treatment. To obtain satisfactory control for cucumber anthracnose by some means other than application of foliar fungicides.
Pl. Path. 760

Miss. Diseases of Cucurbits with Special Emphasis on Breeding Disease-Resistant Varieties of Watermelons and Cantaloupes Adapted to Mississippi Conditions. To (1) develop high quality watermelons resistant to Fusarium wilt and anthracnose, suitable to Mississippi conditions, and acceptable to shipping trade; and (2) develop commercial variety of cantaloupe resistant to downy mildew, powdery mildew, aphids and possibly to leaf and pickle worms.
Pl. Path. HL-1

Ohio The Development of Disease Resistant Strains of Cucumbers. To develop strains of cucumbers of slicing and pickling types which will be sufficiently resistant to mosaic and possibly bacterial wilt so that the production of the crop may again become profitable to Ohio.
Bot. 24

R. I. Breeding Cucumbers and Melons for Resistance to Downy Mildew. To secure varieties of cucumbers and melons resistant to downy mildew, adapted to our climate, and of desirable shape, size and quality.
Hort. 506

S. C. The Development of Disease Resistant Cantaloupe Varieties. (1) Study techniques of inoculation of cantaloupe plants with causal agents of alternaria leaf spot, downy mildew, powdery mildew, and gummy stem blight, and anthracnose, to learn: reliability of resistance tests on young seedlings; effect of environmental influences on host and pathogen before, during, and after inoculation; a uniform standard technique of testing for resistance; (2) study inheritance of resistance to various leaf diseases and inheritance of morphological characters linked to disease resistance genes; (3) study physiological, anatomical, and morphological aspects of resistance to various diseases; (4) combine high levels of disease resistance with other characters of economic importance.
Hort. 334

Tex. The Cause and Control of "Pimples" a Serious Defect of Watermelons. To (1) establish cause of defect of maturing watermelons known as "pimples," "sand bumps," or "water bumps"; (2) learn how it spreads, and in what form and where inciting agent exists in winter; (3) learn what other plants harbor causal agent or show related condition; and (4) develop control measures.
Pl. Physiol. & Path., Ent., Hort. 904

Onions and Root Crops

Colo. The Development of Onion Varieties and Hybrids Adapted to the Major Onion Growing Areas of Colorado. (1) Incorporate resistance to pink root, purple blotch, and important storage diseases; (2) obtain yields per acre higher than now obtained; (3) select for high quality with emphasis on firmness and shape of bulb, outer scale color and ability to adhere during storage and handling, and lack of sprouting during storage.
Hort., Bot.& Pl. Path. 44 Coop. ARS

Idaho Breeding Curly-Top Resistant Garden Beets and Swiss Chard. To develop curly-top resistant beets and Swiss chard of suitable quality for home gardens and commercial production in Idaho.
Pl. Path., Hort. 215

Idaho Breeding Hybrid Onion Varieties for Storage and Dehydration in Idaho. To develop (1) hybrid onion varieties having high yielding ability, improved appearance and storage quality, and resistance to certain diseases; (2) yellow or white hybrid onions having high yielding ability coupled with high solids content for use in dehydration.
Hort., Pl. Path. 253 Coop. ARS

Idaho Factors Responsible for the Occurrence and Dissemination of Epiphytotoics of the Neck-Rot Disease of Onion. (1) Learn when initial infection occurs; (2) follow progress of organism from infection through disease cycle; (3) conduct chemical control experiments as foliar field spray or dust and storage treatment; (4) study progress of disease in storage; and (5) cull onion piles and warehouse dumps for spore spread and dissemination; (6) learn if disease is accumulative under continuous cropping practices.
Pl. Path. 316

Ill. Epidemiology and Control of the Onion Bulb Nematode in Set Production. To obtain information and develop techniques that will permit confinement, control, and, if possible, eradication of this nematode where sets are grown.
Pl. Path. 68-379 Coop. ARS

La. The Culture and Breeding of Creole Onions. (1) Development of yellow and white varieties and strains for American market, strains will be selected from Red Creole, hybrids will be made between red and white and existing yellow varieties; from these crosses, yellow selections will be obtained; (2) establishment of high solid strains having high solids content so as to improve storage quality. Bulbs having high solids content will be selected and planted; progenies of each will be tested; (3) to breed varieties and strains which are resistant to downy mildew and pink root; (4) to develop male sterile lines to be utilized in production of hybrid onion seed; (5) work out most satisfactory cultural methods.
Hort. 411

Mass. Root Diseases of Parsnips and Control Measures. To study (1) pathogens and environmental factors involved in the wastage of parsnips; (2) cultural and storage practices contributing to wastage of parsnips from disease; (3) control measures.
Bot. 20

Mich. Control of Onion Diseases by Breeding for Resistance and by Other Control Measures. To develop onion varieties resistant to disease, particularly downy mildew, pink root and possibly smut.
Bot. & Pl. Path. 5

N. Mex. Development of Hybrid Varieties of Onions of the Grano Type. To develop one or more first-generation hybrids that are superior to White Grano and Early Grano in the following: (1) yield; (2) uniform early maturity; (3) uniformity of size and shape and color; (4) resistance to bolting; (5) resistance to pink root disease; and (6) resistance to thrips injury.
Hort. 6

N.Y. (Cornell) The Bulb Nematode Disease of Onions. Learn host range of onion bulb nematode. Study overwintering of nematode and nature and relation of onion set infection.
Pl.Path., Hort. 133-1,25

Tex. Treatment of Onions to Extend the Marketing Period. To (1) develop a commercially practical infra-red post harvest onion treatment; (2) construct an experimental moving belt-type infra-red onion treating apparatus; and (3) learn detrimental effects a standardized infra-red treatment may have on keeping quality of untested commercial varieties.
Pl. Physiol. & Path., Agr. Econ., Hort. 665

Utah — Onion Improvement. To (1) develop improved male-sterile and inbred strains of several onion varieties, including Yellow and White Sweet Spanish, for use in production of new onion hybrids; (2) test new varieties and selections, particularly new hybrids, for commercial possibilities; (3) carry out genetic studies on several plant and bulb characters, including fundamental studies on nature and inheritance of male sterility; (4) carry out cytogenetic studies of Allium cepa x A.fistulosum hybrids with particular attention to production of superior varieties of green bunching onions; and (5) breed for disease resistance with emphasis on resistance to onion pink root

Hort. 366 Coop. ARS

Potatoes

Alaska — Potato Breeding and Propagation. To (1) develop at Matanuska a productive, high quality potato for the early market, and a productive, high quality potato with desirable horticultural characteristics that will keep well in storage; and (2) evaluate all commercial varieties and new introductions in the States and foreign introductions to the States for their desirability toward attaining the above, and to maintain disease-free germplasm of all lines that appear to be valuable for the breeding program in Alaska.

Hort. 4 Coop. ARS

Alaska — Tuber Injury and Pathogenic Decomposition of Potatoes Marketed in Alaska. Devise processing and handling methods adapted to Alaska's potato marketing industry so as to reduce mechanical damage and decrease storage and marketing losses.

Agr. Engin., Pl. Path., Ent. 33 (M)

Alaska — Factors Affecting the Development of Potato Ring Rot Under Alaskan Conditions. To (1) study factors affecting the development of ring rot in order to determine more efficient methods of detection of the disease; and (2) develop more effective control measures.

Pl. Path. 48

Alaska — Control of Potato Scab in Alaska. To devise control methods for potato scab that will be effective under Alaskan conditions.

Pl. Path. 49

Alaska — Insect Transmission of Potato Witches'-Broom in Alaska. Learn (1) insect vector(s) of potato witches'-broom; (2) susceptibility of vegetable and forage plants to this disease.

Ent., Pl. Path. 58 Coop. ARS

Colo. Control of Insects Transmitting Potato Viruses in Colorado. Learn (1) what insecticides give best control of aphids and leafhoppers; (2) most effective and economical rates of application; (3) if systemic insecticides will give protection to the potatoes late in growing season when there is a build up of aphid and leafhopper population.
Ent. 36 Coop. ARS

Idaho Effect of Irradiating Russet Burbank Potatoes with Radio-Active Fission Products upon Their Storage and Market Qualities, Disease Prevention and Killing of Nematodes Contained Within the Tubers. To learn (1) dosage of irradiation from fission products that will inhibit sprouting of Russet Burbank tubers; (2) effect of said treatment on taste, cooking and processing qualities, flesh color and greening of skin under normal retail conditions; (3) loss during storage due to rots, shrinkage, and sprouting compared to non-treated tubers; (4) temperature that will allow least moisture, sprout, and rot loss to treated tubers; (5) how long marketing can be extended by use of treatment and still receive consumer acceptance; (6) best time for using treatment to expect best results; (7) possible effect of irradiation of tubers in delaying expression of Verticillium wilt through modification of dormancy; (8) if said dormancy can be broken by use of ethylene or other chemicals; (9) if Ditylenchus destructor can be killed by irradiation without injuring table quality.
Hort. 268 Coop. AEC

Ind. Control of Scab, Late Blight and Virus Diseases of Potato. Learn value of combined resistance to potato scab, late blight, and virus X. Reduce costs and increase efficiency of fungicidal control of potato foliage diseases through use of late blight resistance. Learn feasibility of producing virus-free seed potato stocks.
Pl. Path., Agron. 840

Iowa Potato Breeding. To (1) develop a potato variety with good cooking and market quality, disease resistant, and adapted to muck soils; (2) produce combinations of desirable characters in strains of potatoes for use as parents in breeding program; (3) study techniques and methods, and develop procedures for screening and selecting superior lines in segregating progenies; (4) maintain promising selections and parent cultures and to increase these for distribution to an exchange with other stations cooperating in the National Breeding Program; and (5) emphasize breeding for disease resistance toscab, late blight, and certain virus diseases.
Hort., Pl. Path. 1184

La. Development of High Yielding Disease Resistant Potatoes for Louisiana Conditions. To breed varieties resistant to early and late blight, rugose, and mild mosaic, to increase yields and better quality of tubers, and help certified seed industry, particularly in regard to export of Louisiana seed potatoes.
Hort. 395 Coop. ARS

Maine Fungus Wilts of Potato Plants in Maine. To (1) determine relative importance of Verticillium albo-atrum, Fusarium spp., Colletotrichum atramentarium, and other fungi as causes of potato wilt; and (2) study Verticillium wilt with respect to effect on yield rate and tuber quality; varietal resistance; effect of soil type, soil treatments, fertilizer, and season on percentage of incidence, symptoms, and yield reduction; disinfection of implements and containers; development of inspector's field test for presence of fungus; other hosts, weed and crop; crop rotation; and relation to pink-eye and red-xylem diseases.
Pl.Path. 6 Coop. ARS

Maine Control of Potato Diseases by Chemicals. To discover and develop improved methods of control of potato diseases with chemicals.
Pl. Path. 22 Coop. ARS

Maine Breeding, Selecting, and Testing for Potato Disease Control. To (1) develop potato varieties with resistance in immunity to X-virus, leafroll, ring rot, late blight, and scab; (2) develop potato seed stocks that are free of X-virus, ring rot, etc., and (3) test such resistant varieties and healthy seed stocks for yielding capacity, tuber type, and cooking quality.
Pl. Path., Ent. 27 Coop. ARS

Maine The Development and Control of Potato Tuber Diseases and Discolorations During Storage and Handling. Learn (1) effect of cultural practices andhandling methods on susceptibility of tubers; (2) susceptibility of different varieties; (3) effect of various storage conditions on rot development; (4) effect of chemicals and other control measures applied during storage and handling on rots and discoloration of tubers; (5) effect of rot organisms and physiological discolorations on tissues of tuber by histological methods.
Bot., Pl. Path. 117 Coop. AMS

Mich. Disease Resistance in Potatoes. To (1) cooperate closely with potato breeding project in incorporating disease resistance in new potato varieties; (2)advance our fundamental knowledge of nature of disease resistance, factors influencing infection, symptom expression, and transmission; (3) develop means of eliminating at early stage susceptible potatoes from a population segregating for disease resistance; (4) use accepted procedures in identifying resistant seedlings in a progeny segregating for disease resistance; (5) evaluate clonal lines for resistance to disease; and (6) maintain good quality seed of advanced selections and parental stocks by greenhouse indexing and carefully maintained field seed plots.

Bot., Farm Crops 85

Minn. Potato Improvement Through Parental Line Breeding. (1) Expand study of methods of using inbreeding and outbreeding; (2) obtain information on efficiency of using various possible methods of combining and obtaining a high degree of homozygosity of desirable characters and utilization of clones in obtaining improved varieties.

Hort. 2128 (NC-35) Coop. ARS

Mo. Commercial Culture of Truck Crops and Greenhouse Vegetables.--g. Cultural Practices to Improve Irish Potato Yields and Storage Keeping Quality. To (1) make field tests of adaptability of newly introduced varieties to soil and climate of the commercial potato section of Missouri; (2) compare market and storage qualities of these varieties with predominant varieties to find early varieties of both red and white types with more uniformity, better appearance and shipping,handling and storage qualities; (3) attempt a correlation of yield and internal breakdown with fertilization practices and level of exchangeable soil potash; and (4) evaluate seed treatment with pentachloronitrobenzene as practical control of Actinomyces scabies.

Hort. 121-g

Nebr. The Development of New Varieties of Potatoes with Superior Disease Resistance, Yield and Quality. To develop new varieties which mature early and will be superior to present varieties in: (1) resistance to soil borne diseases; (2) resistance to tuber cracking at harvest time; (3) better culinary quality especially to be superior in texture; (4) high ascorbic acid content; (5) attractive market appearance; (6) resistance to flea beetle, leaf hoppers or psyllids; (7) greater degree of heat and drought endurance; (8) ability of tubers to heal wounds rapidly; and (9) resistance to any other potato diseases.

Hort. 229

Nebr. Breeding Potato Parental Lines for Resistance to Scab, Heat, and/or Drouth. (1) Develop parental lines with a high degree of homozygosity, for resistance to types of common scab occurring in State combined with red skin of tubers, pollen fertility, and heat and drouth endurance.; (2) incorporate in breeding lines desirable characters obtained from lines developed by breeders of other States; (3) superior genes from other species into lines developed in 1 and 2; (4) learn physiological or morphological bases for heat and/or drought endurance and differences in metabolic efficiency or different clonal lines of potatoes; (5) establish techniques for increasing efficiency of breeding programs by utilizing parents of greater homozygosity with proven combining ability.
Hort. 540 (NC-35)

N. Y. (Cornell) Biochemical Studies for the Control of the Golden Nematode Disease of Potatoes. To investigate factors associated with hatching of golden nematode to obtain a means of controlling or eradicating the organism.
Biochem. & Nutr., Pl. Path. 72

N.Y. (Cornell) Studies on the Control of Insects Attacking Potatoes. I. Control of Insects Attacking Potato Foliage; II. Control of Insects Attacking Potato Tubers; IV, Control of Insect Vectors of Potato Virus Diseases.
Pl. Path., Veg. Crops. Ent. 97

N. Y. (Cornell) Virus Diseases of Potatoes.--13, Biochemical Investigation of Potato Viruses. To determine (1) the fundamental properties of each potato virus; and (2) mechanism by which viruses are able to multiply and cause disease.
Pl. Path., Agr. Engin., Bot.& Physiol. 127-13

N. Y. (Cornell) A Study of the Factors Affecting the Efficiency of Potato Spraying and Dusting. To find better materials and methods of spraying potatoes.
Pl. Path. 128

N. Y. (Cornell) Permanent Improvement of the Potato by Plant Breeding Methods. To produce by plant breeding methods varieties resistant to black-spot leaf-roll, scab, blight, etc., which are horticulturally acceptable and adapted to Long Island conditions.
Pl. Path. 130 Coop. ARS

N. Y. (Cornell) Studies to Determine Causes and Control Measures for Sub-Surface Black Spot of Potatoes. To determine causes of black spot and devise measures for its elimination or prevention.
Veg.Crops. 164

N. C. Irish Potato Breeding. To (1) develop varieties which are early maturing, productive, resistant to major diseases and insects, and superior in carrying and in market qualities; (2) establish and maintain special breeding lines carrying genetic characters that are important in southern region; (3) study inheritance of a. resistance to scab, and to southern bacterial wilt, b. tuber color, and c. time of maturity.
Hort. 81 Coop. ARS

N. Dak. Nitrate Production in the Soil and its Effect on Potato Scab. Learn (1) effect of various amounts and forms of inorganic soil N on development of PotatoScab; (2) conditions influencing accumulation of a high amount of ammonia nitrogen in soils.
Hort., Agron., Bact. 8-1

N. Dak. The Nature of Virus Y Resistance in the Potato Selection ND457-1 and Some of its Progenies. Learn what characteristics are responsible for virus Y resistance.
Pl. Path., Hort., Ent. 12-6R (NC-35) Coop. ARS

Pa. Breeding Disease-Resistant Varieties of Potatoes. To breed new varieties of potatoes resistant to disease, superior in appearance and quality, and adapted to Pennsylvania environmental conditions and market.
Bot. 755 Coop. ARS

S. Dak. Potato Diseases and Their Control. To (1) develop a practical method of producing disease-free foundation stocks in South Dakota; (2) devise effective practical method of exterminating potato ring rot organism from storage and transportation facilities, machinery, tools, etc.; (3) test effectiveness of fungicides as seed treatments and foliage protectants in potato disease control; and (4) locate sources of resistance against important potato diseases in South Dakota, particularly scab.
Pl. Path. 107

Wash. Resistance of Potato Varieties and Seedlings to the Virus Leafroll Disease. To (1) test potato varieties and unnamed potato seedlings for resistance to infection by leafroll virus under field conditions; (2) study nature of leafroll resistance in order to facilitate testing for resistance and breeding of resistant varieties; and (3) test potato varieties and seedlings for development of phloem necrosis in tubers following infection with leafroll virus.
Pl. Path. 274

Wash. The Breeding and Development of Potato Varieties. To develop and test new and old varieties of potatoes and determine their comparative values as related to commercial adaptability, and to cooperate with Plant Pathology Department in determining their resistance to leaf roll.
Hort., Pl. Path. 1122 Coop. ARS

W. Va. Improvement of Potato Varieties for West Virginia. (1) To select promising breeding stocks of improved physiological and morphological characteristics having greater resistance to disease, insect injury, and unfavorable environmental qualities commonly found in West Virginia; and (2) to learn the nature, variability, and methods of inheritance of resistance in potato varieties to diseases and to injuries by insects and environmental factors.
Hort., Pl. Path. 4

Wis. The Improvement of Quality and Disease Resistance of the Potato and Methods of Accomplishing This by Breeding. Develop high quality and disease-resistant potatoes that will sell more successfully on early and late markets.
Genet., Pl. Path. 566 Coop. ARS

Wis. Relationship of Plant Nutrition to Disease Incidence and Expression of Symptoms. To learn influence of various (1) plant nutrient ratios and levels on visual expression of certain potato virus and other diseases; (2) nutrient ratios and levels on plant susceptibility to disease and their effect on yields; (3) nutrient ratios and levels on behavior of virus in plant, measured quantitatively; (4) potato virus diseases on nutrient uptake by plant.
Pl. Path., Ent., Soils 774

Wyo. Breeding and Selection Studies with Potatoes. To (1) test varieties and promising seedlingsfor adaptation to Wyoming; (2) develop new superior varieties; (3) test new varieties and promising seedlings for ring rot and scab resistance for keeping and cooking quality; and (4) maintain foundation seed of adapted varieties.
Agron. 488

Sweet Potatoes

Ga. Improvement of Sweet Potato Varieties for Table Purposes Through Breeding. To obtain, through breeding or introduction, sweet potato varieties which have superior yielding ability, higher market and nutritive values, greater disease resistance and better adaptability for specific uses than presently known kinds.
Hort. 89

Ga. A Study of the Relationship of Insects to the Transmission of a New Sweet Potato Mosaic Virus. Learn (1) if an insect is the vector of the causative virus of sweet potato mosaic; (2) if so, when it occurs on plantings and at what period transmission occurs; (3) establish a control measure for the vector.
Ent. 221 Coop. ARS

La. Breeding and Genetic Studies of the Sweet Potato. To (1) breed table type varieties that have the following desirable characteristics: uniform shape, high yield, high sugar and carotene content, storage ability, sprout production and cooking qualities, ideal type for fresh market, as well as for canning, etc.; (2) breed varieties and seedlings to be used as parents that are resistant to these diseases and insects: Fusarium wilt, soil rot, internal cork, nematodes, and weevil; (3) study mode of inheritance of genetic characters and disease resistance; and (4) breed varieties higher in starch and yielding ability which could be used in making starch, feed, etc.
Hort. 527 Coop. ARS

La. Breeding Sweet Potato Varieties for Internal Cork Resistance. Further test and evaluate existing parental lines for resistance to internal cork. Collect and evaluate new lines which may be resistant to disease. Study mode of inheritance of resistance to internal cork. Evaluate new seedlings for commercial possibilities. Maintain and distribute internal cork resistant material.
Pl. Path., Hort. 866

La. A Study of the Internal Cork Disease of Sweet Potatoes. To make basic studies of internal cork disease of sweet potatoes necessary to permit eventual control of disease.
Pl. Path., Hort. 867

La. A Study of Insect Vectors of Internal Cork and of Foliage Feeding Insects of Sweet Potato. Learn vector(s), responsible for transmission of internal cork of sweet potato. Study biology and ecology of vector to learn methods of attack for its control. Develop control measures for vector. Learn effect of foliage feeding insects on yield and quality.
Ent. 869

Md. The Nature and Control of Sweet Potato Diseases Occurring in Maryland, Including Studies on Significance of Microbiological Antagonism. To (1) develop better methods to control diseases of economic importance; (2) undertake any studies needed to better understand the cause and control of sweet potato diseases; (3) study antagonistic effect of various organisms in relation to pathogens affecting sweet potatoes; (4) study use of antagonism as a commercial control of sweet potato diseases; and (5) if promising antagonistic organisms are found, to also study relation to other plant pathogens.
Bot., Hort. J-86-a Coop. ARS

Miss. The Breeding and Evaluation of Sweet Potato Varieties and Selections for Yield, Quality, and Disease Resistance. To find varieties of sweet potatoes which will produce higher yields of better quality, more total food per acre, and that will be better adapted for canning.
Hort. HK-13 Coop. ARS

N. J. The Control of Certain Sweet Potato Diseases by Treatment of the Potatoes and Sprouts. To (1) study sprout treatments for control of scurf and stem rot; (2) establish Actinomyces ipomeae (pox) in ground beds for further study; and (3) test boron as a possible control for sprout decay, and Fermate in plant bed soil to control the disease.
Pl. Path. 460

N. J. Sweet Potato Storage Investigations. To determine effect of various temperatures and humidities during the curing period on the incidence of several diseases affecting sweet potato during storage period and to consider effect of environmental factors occurring during holding period on keeping qualities and of increasing Co_2 and O_2 concentrations in storage house air.
Pl. Path. 461

N. C. Sweet Potato Breeding and Testing. To (1) develop varieties of sweet potatoes with improved quality, high productivity, resistance to Fusarium wilt and internal cork, and desirable storage and sprouting characteristics; (2) evaluate experimental clonal lines and introduction for horticultural and processing charzcteristics, and resistance to Fusarium wilt and internal cork; (3) study factors affecting flowering and fruit setting (seed production), and specific combining ability in breeding stocks; and (4) investigate possibility of maintaining healthy stocks to be used as foundation seed: a. maintenance of old varieties, and b. maintenance and releases of new varieties.
Hort. 86 Coop. ARS

N. C. Investigations on the Field Diseases of Sweet Potatoes. To (1) investigate the role of nematodes in sweet potato production and use of nematocides for their control; (2)survey horticultural and agronomic crops for strains of Fusarium oxysporium that are infectious to sweet potato; (3) establish value of vine cuttings in controlling black rot and scurf of sweet potatoes, and role of soil organic matter on longevity of the respective pathogens, Endoconidiophora fimbriata and Monilochaetes infuscans; (4) investigate mode of transmission, host range, diagnosis and physiology of internal cork disease and other viruses; and (5) study life cycle and economic importance of Fusarium surface rot.
Pl.Path. 91

Okla. Improvement of Sweet Potatoes by Breeding. (1) Develop better varieties of sweet potatoes with: greater production of marketable roots; more attractive shape and color of roots and improved culinary quality; greater nutritional value with specical reference to carotene and ascorbic acid contents; disease resistance with special reference to stem rot, soil rot and nematodes; improved keeping quality of roots and ability for sprout production; growth of vining habits which adapt crop to mechanized cultural and harvesting operations; (2) gain knowledge of transmission of above characteristics from parent plant to its progeny; inheritance of wilt, nematode, and soil rot resistance; inheritance of vitamins A & C; (3) study factors affecting flowering and cross and self-incompatibilities relating to fruit-set and seed development.
Hort. 596

S. C. The Breeding and Improvement of Sweet Potatoes. To study (1) strains which are productive and free from disease and which produce roots of desirable shape and quality; (2) possibilities of creating homozgyous strains constant for yield, root shape, and other factors;(3) development of new varieties and strains which combine earliness, disease resistance, productivity, and high quality.
Hort. 121

Tomatoes and Peppers

Ark. Breeding and Selecting Tomatoes. To produce varieties or strains of tomatoes suitable in quality, yielding ability, and disease resistance to the needs of tomato growers in Arkansas.
Hort., For. 206

Ark. Etiology and Control of Seed-Borne, and Soil-Borne Diseases of Tomatoes. To (1) determine importance and distribution of various diseases; (2) study effect of cultural practices, soil types, and varieties as related to the incidence and control of diseases of tomatoes; and (3) determine variability in virulence and adaptability of pathogens existing under Arkansas conditions.
Pl. Path. 298

Fla. Virus Diseases of Tomatoes. Study virus diseases of tomatoes with respect to identification, insect vectors, distribution and field sources.
Pl. Path. 741

Fla. Virus Disease Resistance of Peppers. (1) Locate, within genus Capsicum sp., sources of resistance to the major virus diseases of peppers; (2) learn mechanism of inheritance of resistance; (3) incorporate resistance into bell-type peppers.
Pl. Path. 866

Ga. Breeding Pimiento for Disease Resistance and Ability to Set Fruit Under Climatic Conditions of Georgia. To (1) develop a stable and productive strain of pimiento for canning, producing fruit of the desired size and shape; and (2) incorporate into this strain resistance to some of the more destructive diseases.
Hort., Pl. Path. 88

Hawaii Tomato and Sweet Pepper Improvement and Genetics. Develop locally adapted tomato varieties with increased disease resistance and superior horticultural qualities as: plant vigor, upright habit, earliness, improved vitamin C content, commercial fruit size, multiple disease resistance, etc.
Veg. Crops 816

Idaho Control of Curly Top on Tomato by Breeding. To breed tomatoes of suitable commercial quality that are resistant to the disease.
Pl. Path. 212

Ind. Breeding and Evaluation of New Varieties and Hybrids of Tomatoes for Processing in Indiana. Breed (1) new varieties and hybrids with improved disease resistance, quality, handling characteristics, yield, and ability to set under high temperature conditions, which are early and suitable for processing; (2) new adapted, paste-type varieties and hybrids for use in tomato products; (3) new varieties and hybrids suitable for machine harvesting; (4) learn responses of new varieties and hybrids to soil type, fertility, spacing, and planting methods under State conditions; (5) evaluate "synthetic" varieties in direct seeding.
Hort., Bot. & Pl. Path. 952

La. Tomato Improvement Project. (1) Learn host-parasite relationship between internal browning (grey-wall) of tomato and virus or viruses that may be involved; (2) screen varieties that may have resistance to these viruses and to Fusarium wilt organism, and learn their possibilities for growing under State conditions; (3) initiate a breeding program designed to get disease resistance into acceptable varieties; (4) investigate early blight disease and its methods of control.
Pl. Path. 932

Miss. Investigation of Pepper Diseases and Their Control Under Mississippi Conditions. To (1) determine diseases on peppers in State and relative crop damage; (2) seed control of major diseases of economic importance; (3) survey all seed stocks for possible resistance and incorporate desirable resistance into suitable types; and (4) develop techniques for rating disease reaction.
Pl. Path. HL-9

Miss. Nematode Resistance in Peppers. Investigation of resistance to root-knot nematodes found in certain strains of pepper. Determine mode of inheritance of resistance. Transfer, if found feasible, such resistance to commercially desirable varieties of pepper.
Pl. Path. HL-12, RRFL-2 (S-19)

N. H. Testing Tomato Varieties and Selections for Resistance to the Early Blight (Alternaria Solani) and Late Blight (Phytophthora Infestans) Pathogens. Find sources of resistance to (1) Alternaria solani; (2) various races of Phytophthora infestans; (3) test tomato plants grown from irradiated seeds for resistance to A. solani; (4) progeny of resistant selections for disease resistance, and learn methods of inheritance of disease resistance.
Bot., Hort. 121

N. Mex. Improvement of Chile (Capsicum Annuum) for Pod Type, Yield, Earliness, Pungency and Resistance to Disease. To (1) develop one or more new varieties of chile which combine better characters of College No. 9, College No. 6, and "Native" varieties, including early maturity; high yield; large, smooth pungent pod; etc.; and (2) complete improvement of a strain of No. 6 type which will be suited for use as fresh green vegetable and for commercial canning and freezing, with such characters as long, smooth, fleshy pod; early maturity; and high yield.
Hort. 21

N. C. Breeding Productive, High Quality, More Disease-Resistant Tomatoes for North Carolina. To develop productive, high quality varieties, and strains that are resistant to major tomato diseases in North Carolina.
Hort. H-85

N. Dak. Breeding Tomatoes for Earliness, Yield, Size, Quality, Ascorbic Acid Content and Disease Resistance. To develop improved tomato varieties or hybrids for North Dakota with respect to early maturity, yield, size and shape of fruit, quality, high ascorbic acid content, disease resistance, and adaptation to a wide range of soil and climatic conditions.
Agr. Chem., Hort. 12-3

Ohio

Disease and Insect Resistance in the Tomato: A Breeding Project. To (1) develop varieties of tomatoes, resistant to Fusarium wilt, leaf mold, mosaic, and Septoria and Alternaria leaf spots by combining genes for resistance in wild species with genes for desirable qualities in domestic species; (2) study fungi causing diseases from standpoint of physiologic races and their distribution; (3) isolate differential accessions for identification of physiologic races of above disease producing organisms; (4) evaluate developed accessions for resistance to insects which attack glasshouse-and field-grown tomatoes; and (5) study nature of resistance to disease to determine loci on chromosomes of the genes which govern resistance and to conduct embrylogical studies to determine cause, nature and degree of incompatibility in interspecific hybrids within genus Lycopersicon.

Bot. 37

Ohio

Cytogenetics and Embryology of the Domestic Tomato, the Wild Species of Tomato and Their Hybrid Derivatives in Relation to Disease Resistance, Hybrid Sterility and Self Incompatibility. To study (1) pollen tube growth, fertilization, embryo and endosperm development in tomato, its wild relatives, and interspecific hybrids derived from them; (2) chromosome number and behavior in interspecific hybrids of tomato and their derivatives; (3) genetics of self-incompatibility in genus Lycoperisicon.

Bot. 37-1

Ohio

Biology of the Tomato Early Blight Organisms with Reference to the Existence of Races and Resistance. To (1) determine existence of physiological races of A. solani, A. tenus and A. tomato, (2) study parasitism of above named fungi to determine if small necrotic lesions constitute resistance of susceptibility to the parasites; and (3) screen tomato P.I. accessions for resistance to above organism.

Bot. & Pl. Path. 72-2A (NC-7)

Ohio

Control of the Mosaic Diseases of Tomatoes. To (1) develop a method to control mosaic diseases of tomatoes caused by Marmor tabaci, var. vulgare, and other viruses; and (2) study basic principles of tobacco mosaic virus and other viruses involving isolation and purification of virus, study in vitro, and parasitism of virus.

Bot. 86

Pa.

Genetics and Cytogenetic Studies in Capsicum Frutescens.--The Cultivated Pepper. To determine (1) how available material may be used in breeding new commercial varieties or improving standard varieties; (2) F_1 combining ability of pepper varieties and strains; (3) feasibility of using F_1 or F_2 generations for commercial production; and (4) amount of natural crossing in pepper, and isolation required to obtain true breeding stocks.

Hort. 1049 (NE-9)

Pa. The Internal-Browning Disease of Tomatoes.--A. The Relation of Viruses to the Disease Known as Internal-Browning of Tomatoes. To (1) determine nature of the disease of tomato known as internal-browning; and (2) develop satisfactory control measures.
Bot. 1170-A

Pa. The Internal-Browning Disease of Tomatoes.--B. The Relation of Inherent and Certain Environmental Factors to Internal-Browning of Tomatoes. To Learn (1) influence of varied nutrition and moisture levels on incidence of internal-browning in tomato varieties and hybrids; and (2) extent of inherent susceptibility or resistance to this disorder.
Hort. 1170-B

P. R. Tomato Breeding. To develop by breeding and selection, varieties suitable for the local and export market, expecially adapted to grow during the late spring and summer months.
Pl. Brdg. 49

S. C. Breeding of Pungent Peppers. To develop one or more varieties of the Cayenne type having highly productive and disease resistant plants and pods of desirable size and shape which are easily picked and dry uniformly and producing a ground product which retains its color well in storage and possesses a high capsaicin content.
Hort. 15 Coop. ARS

S. Dak. Production and Breeding of Early, Drought and Disease Resistant, High Quality Tomatoes for Home Use. (1) To determine best cultural practices to secure early tomatoes; and (2) to develop by hybridization tomato varieties which combine drought and disease resistance with earliness and high vitamin C content.
Hort. 49 R

Tex. Breeding Tomatoes for Resistance to Diseases. Develop (by breeding and selection) high yielding, good quality types of tomatoes resistant to major tomato diseases occurring in Texas.
Pl. Path., Hort. 554 Coop. ARS

Tex. Breeding Commercial Shipping and Canning Varieties of Tomatoes for South Texas. Study adaptability of tomato varieties to south Texas and learn which varieties further breeding and selection; develop tomato varieties through breeding combining earliness, high yields, and market and consumer acceptance adapted to commercial production for shipping and for commercial canning; incorporate resistance to diseases and physiological abnormalities.
Pl. Path., Hort. 1026 Coop. ARS

Utah — Breeding for Resistance to Curly Top of Tomatoes. (1) Produce commercially acceptable tomato varieties resistant to curly top; (2) find or develop more resistance to curly top than is now available; and develop a commerical tomato of more resistance.
Bot. & Pl. Path. 330 Coop. ARS

W. Va. — Improvement of Tomato Varieties for West Virginia. To (1) select by extensive testing, tomato varieties with resistance to late blight and other diseases, insects of unfavorable environmental factors commonly found in W. Va.; (2) incorporate these resistant characters into high yielding and high quality tomato varieties adapted to the growing conditions of W. Va. by crossing, backcrossing and selection, in both field and greenhouse; (3) determine nature, variability and method of inheritance of resistance to tomato diseases and to injuries by insects and environmental factors; and (4) study pathogens for occurrence of pathogenic races and study any phase of diseases fundamental to program.
Hort., Pl. Path. 58

Miscellaneous

Ill. — Rust Resistance in Asparagus. To develop methods of control of asparagus rust by fungicides and breeding, including (1) reinvestigation of life history of the pathogen, host-pathogen relations, artifical inoculation methods and use of eradicant and summer sprays; and (2) selection of existing rust resistant strains and their propagation, methods of securing lines homozygous for rust resistance, and crossing these lines to secure superior hybrids.
Hort. 65-348

Ill. — Etiology, Epiphytology and Control of Asparagus Rust. Investigate (1) systemic spread of the pathogen within suscept tissues; (2) possibility of existence of strains or races of the rust pathogen; (3) eradicative and systemic fungicides in the greenhouse and in the field.
Pl. Path., 68-348

Iowa — Sweet Corn Breeding. To (1) develop inbreds with special emphasis on combining ability and quality; (2) explore possibility of using gene Sh_2 to increase quality; (3) test feasibility of using monoploid derivatives for producing homozygous lines; (4) develop European corn borer resistant or tolerant inbred lines; and (5) breed for resistance to Helminthosporium turcicum and bacterial wilt and corn ear worm resistance.
Hort., Pl. Path. 1186 Coop. ARS

Mass. Breeding Quality Sweet Corn for the Early Market. (1) Evaluate early sweet corn hybrids for use under northeastern conditions for fresh market; (2) develop early, high-quality varieties of sweet corn resistant to bacterial wilt.
Hort. 93 (NE-32)

Minn. Breeding an Improved Strain of Asparagus. To breed an improved strain that could be furnished to seed growers for distribution to the public and to test available strains at three different localities in the State.
Hort. 2117

N. J. Breeding Adapted Sweet Corn Hybrids for New Jersey. (1) Evaluate sweet corn varieties for fresh market use and freezing in the Northeast and evaluate inbreds; (2) make up sweet corn breeding composites for Northeast within and among distinct maturities that may be inbred at various locations by individual breeders; (3) produce promising hybrid combinations under a planned procedure and evaluate before inclusion of best in uniform trial; (4) develop and apply better screening techniques for bacterial wilt resistance, pollen restoration capacity, heat resistance, and drought resistance.
Farm Crops, Food Tech. 262 (NE-32)

N. J. Asparagus Breeding. Develop (1) productive asparagus strains of high quality and disease resistance; (2) quick methods for evaluation of individual plants in early life; (3) methods for estimating yielding ability of progeny lines without full season cutting records; (4) mass production methods for vegetative propagation of old asparagus plants of proven genetic value; (5) a sound method for maintenance and distribution of foundation asparagus seed to New Jersey growers.
Pl. Path. 353

N.Y. (Cornell) Investigations of the Control of the Six-Spotted Leafhopper, The Vector of Aster Yellows in Lettuce (1956). To determine the possibilities of controlling the yellows disease of lettuce through measures aimed at control of the leafhopper vector.
Ent., Veg. Crops 93

N. Y. (Cornell) Breeding Market Cabbage for Yield, Disease Resistance, and Uniformity. Develop improved varieties of cabbage suitable for market use through the addition of disease resistance to Yellows and clubroot, and through development of first generation hybrids.
Pl. Brdg. 213

N. Y. (Cornell) Breeding Celery for Disease Resistance and Better Marketability. Develop varieties of celery which meet present market demands and which can be grown dependably in New York, especially by reason of having resistance to Cercospora or early blight.
Pl. Brdg. 214

Pa. Breeding Sweet Corn Hybrids Adapted for the Northeast With Particular Emphasis on Bacterial Wilt Resistance. (1) Screen inbreds, hybrids, synthetics, and open pollinated populations for resistance to Stewart's disease caused by Bacterium stewarti (E.F.S.) study correlation between wilt resistance and other physiological and morphological characteristics; (3) participate in uniform trials designed to evaluate sweet corn hybrids and inbreds for adaptation in the Northeastern Region.

Hort., Bot., Pl. Path. 1307 (NE-32)

Tex. The Breeding and Improvement of Spinach Varieties for Texas, Including Resistance to Diseases. To (1) test domestic and foreign introductions of spinach and also all breeding material for resistance to white rust, downy mildew, and virus diseases; and (2) develop varieties, through breeding and selection, resistant to white rust and other diseases, and acceptable for canning, freezing, and fresh spinach shipping industries.

Hort. 489 Coop. ARS

REGIONAL PROJECTS

W-12 Control of Root Rots and Viruses of Dry and Snap Beans by Breeding. (1) To develop new or improved varieties of dry and snap beans resistant to virus diseases, and root rots; (2) to determine causes and control of root rots of beans specifically as related to (a) causal organisms, (b) sources of resistance, (c) cultural, biological, and chemical treatments; (3) to determine the mode of inheritance of the factors for resistance to bean mosaics and curly top; (4) to determine the insect vectors, insect hosts, and virus reservoirs of the bean viruses; (5) to determine the chemical, biological, and physical properties of the curly top and bean mosaic viruses.

Cooperating stations and agencies: Federal-grant projects - Colo., Idaho, Oreg., Wash., Wyo., AMS

OTHER REGIONAL RESEARCH PROJECTS REFERRED TO IN THIS SUMMARY BUT SUMMARIZED ELSEWHERE

NC-7 New Plants - The Introduction, Multiplication, Preservation and Evaluation of New Plants for Industrial and Agricultural Use. See ARS-23-8-12.

NC-35 Potato Improvement Through Parental Line Breeding. See ARS-23-8-22-b.

NE-9 Discovery and Preservation of Valuable Plant Germ Plasm. See ARS-23-8-12.

NE-32 Breeding Sweet Corn Hybrids Adapted for the Northeast. See ARS-23-8-22-a.

S-19 Plant Parasitic Nematodes. See ARS-23-8-17-a.

W-38 Nature and the Influence of Crop Residues on Fungus Induced Root Diseases. See ARS-23-8-17-a.

LIST OF COMPILATIONS OF FEDERAL-GRANT RESEARCH PROJECTS
AT STATE AGRICULTURAL EXPERIMENT STATIONS

ARS-23-8: Part Numbers	Subject-Matter Area	Title of Section
1	Agricultural Chemistry	Agricultural Chemistry
2	Agricultural Economics	a. Prices, Incomes, & General Studies of Commodities & Industries b. Farm Management c. Land Economics d. Farm Finance & Taxation
3	Agricultural Engineering	a. Land & Water Use & Development b. Power Machinery & Equipment c. Farm Structures & Materials
4	Animal Husbandry	a. Beef Cattle b. Sheep & Goats c. Swine
5	Dairy Husbandry	Dairy Cattle
6	Dairy Technology	Dairy Technology
7	Entomology & Economic Zoology	a. Field Crop Insects b. Fruit, Nut & Vegetable Insects c. Miscellaneous Insects & Economic Zoology d. Insecticides
8	Field Crops	a. Cereal Crops b. Oil, Fiber, Tobacco & Sugar Crops
9	Food Science & Technology	a. Food Chemistry, Microbiology, Sanitation & Public Health b. Food Engineering, Processing, Product and Process Development, Utilization and Waste Disposal c. Food Quality & Standards, Acceptance, Preference, & Marketing
10	Forage Crops, Pastures & Ranges	Forage Crops, Pastures & Ranges
11	Forestry	Forestry

ARS-23-8: Part Numbers	Subject-Matter Area	Title of Section
12	Fruits & Nuts	Fruits & Nuts
13	Home Economics	a. Human Nutrition b. Housing c. Clothing & Textiles d. Foods-Consumer Quality & Utilization e. Household Economics & Management
14	Economics of Marketing	a. Field Crops b. Fruits & Vegetables c. Livestock, Meats & Wool d. Dairy Products e. Poultry & Poultry Products f. Forest Products & Ornamental & Drug Plants g. Cross-Commodity & Functional Studies
15	Meteorology	Meteorology
16	Ornamental & Drug Plants	Ornamental & Drug Plants
17	Plant Pathology & Bacteriology	a. Plant Pathology, Botany, & Diseases of Miscellaneous Crops b. Diseases of Field Crops c. Diseases of Fruit Crops d. Diseases of Vegetable Crops
18	Plant Physiology & Nutrition	Plant Physiology & Nutrition
19	Poultry Industry	Poultry Industry
20	Rural Sociology	Rural Life Studies
21	Soils	a. Soil Chemistry & Microbiology b. Soil Fertility, Management & Soil-Plant Relationships c. Soil Physical Properties, Conservation & Classification
22	Vegetables	a. Vegetable Crops b. Potatoes
23	Veterinary Science	Veterinary Science
24	Weeds	Weed Control